

THE MOLDING MACHINE.

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INTRODUCTION.

One of the most remarkable features in the last few decades of the nineteenth century is the radical change in the method of production in our factories. The fields of invention and discovery have been explored of late so wonderfully, that this short space of time is not only prominent, but undoubtedly, it stands pre-eminent for its marvelous progress.

Examine the long lists of new processes, new products, new devises, new means, new machinery, new facts, new knowledge, newly discovered laws of science, and the new requirements, and it should not surprise you, that not only our vocabulary has been greatly enlarged, but also that most of the technical literature of 20 years ago is practically worthless for present use.

Ours is the "Progressive Age," the period in which the sciences and the arts were first associated and succeeded with their combined efforts in clearing the road to rapid advancement. It is but within a space of our lifetime that we have seen the development of the electric light, the telephone, electric power transmission, the gas engine, the phonograph and other new applications of nature's hidden forces, too numerous to mention. Entirely new industries have grown up like mushrooms, good proofs of which are our aluminium, carborundum and calcium carbide factories, and all the others have more or less rapidly advanced. None have lost, but all have profited by it; not only the manufacturers, but the whole civilized world, employer and employed, dealer and consumer, master and man!

The increased demand for a greater variety, for more and for better articles of manufacture, required the employment of skilled labor and the provision of better means for their produc-

tion. Skilled labor could not be produced at the same rate as the demand for goods increased. This gave the impulse for the construction of machines, which, served by unskilled labor would do the work of the handicraft; machines which would do mechanically, speedier and more uniformly than manually, all the work which heretofore was performed only by the hands of the skillful mechanic.

Thus it came about, that the large number and varieties of household devises were introduced, and strange to say, domestic servants are to-day more scarce than ever. Another large group of labor saving machines of our "Progressive Age" are farm implements; yet, did you ever hear of an excess of farm hands? Then we have textile machines, sewing machines, type writing machines, laundry machinery, shoe machinery, type setting machines, wood and ironworking machines of the most improved types and hundreds of other kinds, even down to excavating machines.

These labor-saving appliances are sometimes attended to, each singly, by one man, sometimes it requires more than one man to run a machine, while in other cases one man can serve several machines very conveniently. Some are semi-automatic and others are entirely so. Some machines require expert operators, others can be attended to by unskilled labor; some turn out double the amount and others more than twenty times the amount of work a skilled mechanic can show for the same time. No one can question that such machines have helped the manufacturer quite materially. But on the other hand can it be asserted that any of these devises have ever given a surplus of labor? Or, have they reduced the wages of the workingman in general? There are many proofs to show that they have done neither; but, to the contrary, that they were instrumental in improving the lot of the workingman in every instance. Our commonest laborer lives better to-day, has a better home, is better clothed, gives his children a better education, has better accommodations, is not so hard worked and gets better pay than his predecessors, who toiled hard for their living, and received scanty pay for their work, when there were no machines to fall back on.

Why is it then, that the introduction of labor saving machines is so frequently opposed and objected to by the workmen in the various trades?

The first thought which occurs to the individual worker is undoubtedly the one, that the machines will replace himself. But that is gross short sightedness, it shows a lack of self confidence, it is true only in rare instances, and if at all, it causes only temporary inconvenience to the workingman, by possibly changing his specific occupation. Yet, it is far reaching in the betterment of the lot of the workingman in general; it gives the better man better chances for advancement. It gives the expert mechanic more opportunities to apply and to prove his skill, it increases his wages in all cases, it removes from him all monotonous operations, it gives him better and more chances to use his brain and think of further improvements, it elevates him from the every day laborer to a higher position, and it causes him to rise in the esteem of his employers and co-workers. His services are more sought and better paid, and his skill becomes the more valuable, the more machines are used to perform the regular run and always re-occurring work of his particular trade. Still, it takes some time, before such facts become universally known and appreciated. There are always people who make it their business to antagonize, to cause disturbances, to spread false truths, to create wrong ideas and conceptions and therewith to impose upon others who are weak minded and easily lead. Though they may be sincere and convincing in their utterances, such men are false prophets, who do incalculable harm by opposing the natural course of progress. They advance, invariably, old fashioned ideas, which might have suited in medieval times, or at the time of the "Guilds;" arguments which do not fit the case at all, as it should be dealt with in the twentieth century. Yet, such men have quite frequently a marvelous number of disciples, principally because they claim to appear as benefactors, as representatives and as mediators for the working classes.

Manufacturers as a rule, do not look at the matter in this light; though, there are many among them who hesitate a long time before they will consent to make a change from hand work to the use of machinery. Most of them will watch what their competitors are doing, they will let others do the experimenting, they will let others carry the expenditures to obtain results, and they will let others work out difficult problems without giving them much encouragement. This class of manufacturers is not less short sighted nor more progressive than the parties above men-

tioned, though they are generally esteemed as the conservative element. No doubt, they will get there, slowly but surely, providing they do not lose sight of what is going on around them. Yet, there are many other wide awake producers, who see that there are many processes of manufacture in their particular line of work which could be materially improved upon with a view to lessen the cost of their products, if suitable machinery could be substituted for manual labor. As business men, they will consider this question merely as a business proposition—as a survival of the fittest. They will submit their problems to competent engineers, who are able to turn a crude idea into tangible shape, to experts who can design and construct machinery for them to suit their purpose.

A striking proof of what can be accomplished in this direction is best illustrated by the present labor saving appliances in use for handling grain, ore, and coal, in docks and at blast furnaces and especially by the equipment of modern rolling mill plants. The large fortunes which have been made quite recently by some of the most progressive Iron and Steel manufacturers speak for themselves. They were founded almost exclusively upon a reduction of the cost of production, and to a large extent upon the application of the best obtainable labor saving machines.

The fact that such vast, important and far reaching improvements were introduced in the rolling mill practice should almost lead to the conclusion, that necessarily all associated branches of the iron and steel industries were compelled to keep in line with it, and that they have advanced at a like pace. But it is noticeable that, especially in the foundry practice, this was not the case.

It cannot be said that the foundry has not advanced. Undoubtedly it has made a great step forward, and in the right direction, with the introduction of Chemistry and Physical research. The rule of thumb methods have been almost universally abandoned, and some of the larger foundries, especially those making comparatively small specialties, have introduced methods and appliances which reduce manual labor to a considerable extent. Sand and mold conveyors, sand mixers and traveling cranes at present in use, are among those of the most universal applicable labor saving devices in the foundry. There are a number of

special contrivances, some good, some bad, too numerous to mention, which may be used to advantage here and there, but the most desirable labor saver in the foundry: a universal, really practicable and serviceable molding machine, is still an open question. Many minds have worked on the solution of this problem, and manifold were their productions. The object of this monograph shall be to describe, to illustrate and to discuss in an impartial manner the various methods which were employed, the results which were obtained and the difficulties which are encountered in the construction of a reliable molding machine, and the attempt will be made to describe in detail the adequate requirements necessary to obtain desired results, besides outlining the future possibilities of producing, successfully, miscellaneous sand molds by machinery.

The nature of this subject does not promise it to be a very fascinating topic; yet, owing to the importance of the question it is thought that the treatment here given may arouse the interest of the foundryman sufficiently to follow the matter through. At all events it will make him acquainted with what has been done, and what can be expected of the molding machine in the future. Then, after a careful perusal, he may give the question of machine molding his impartial study and consideration.